

Scanning the Past

Guglielmo Marconi

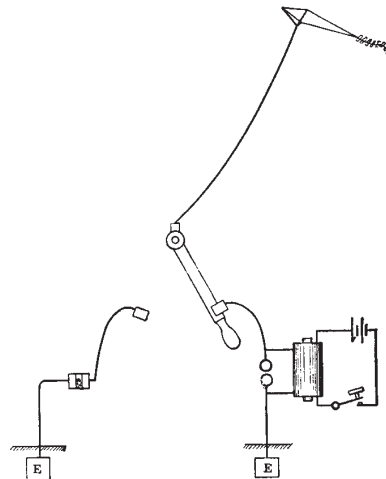
Seventy years ago this month the PROCEEDINGS featured a paper on radio telegraphy by Guglielmo Marconi. He had presented the paper at a June 1922 meeting when he was awarded the Medal of Honor of the Institute of Radio Engineers in recognition of his pioneering contributions to radio communication.

In his paper Marconi called attention to what he termed a "somewhat neglected branch of art," namely the investigation of very short electromagnetic waves. He recalled that his first experiments with wireless communication in 1895–1896 had been with waves only a few inches in length. However, he continued, the rapid development of long-wave communication systems by himself and others had diverted attention from short waves for many years.

Assisted by C. S. Franklin, Marconi had resumed short-wave experiments during 1916–1917, achieving a range of about 30 km at a wavelength of about 3 m. Using a vacuum-tube transmitter and a wavelength of 15 m, he and Franklin established in 1919 a voice-radio link between London, England, and a station more than 150 km away. In his 1922 paper, Marconi mentioned that they had noticed the effect of reflections of short-wave signals by large metallic objects located a considerable distance from their transmitter. He suggested that it should be possible to develop short-wave apparatus to install on ships which would provide warnings of the presence of other ships in conditions of poor visibility.

Marconi was born in 1874 in Bologna, Italy, the son of an Italian merchant and a Scotch-Irish mother. In 1894 he learned of Hertzian waves from Augusto Righi, a professor at the University of Bologna. Convinced that such waves could be used for wireless communication, Marconi conducted preliminary experiments in Italy using a spark-gap source and a coherer detector. Encouraged by his mother, in 1896 he went to England, where he demonstrated his wireless system to officials of the British Post Office and received a patent in July 1897.

With financial support from his mothers' relatives, Marconi organized the Wireless Telegraph and Signal Company in 1897 to develop his system commercially. Moving to longer waves and higher power transmitters, he was able to communicate at a distance of about 30 km by July 1898. In April 1900 he received his famous "four sevens" patent



Marconi transmitting and receiving circuits with antenna "sustained by a kite." (From George W. Pierce, *Principles of Wireless Telegraphy*. New York: McGraw-Hill, 1910.)

(British patent 7777), which covered resonance tuning of the transmitter and receiver to enhance selectivity.

In December 1901 signals from a high-power Marconi transmitter located at Poldu in Cornwall, England, were reported to have been received by a receiving station near St. Johns in Newfoundland. The receiving antenna consisted of a 400-ft-long copper wire supported by a kite, and the detector was an Italian Navy coherer consisting of a globule of mercury between iron terminals and connected to a telephone receiver. In January 1903 a Marconi station at Cape Cod, Massachusetts, sent a short message from President Theodore Roosevelt to King Edward VII in England.

Marconi received a Nobel prize in 1909 for his development of wireless communication.

The January 1928 issue of the PROCEEDINGS included another paper by Marconi reporting on developments in short-wave communication achieved since 1922. Many of his experiments had employed receiving equipment on his yacht *Eletra*. He stated that communication had been possible for 23.5 hours out of 24 from England to Australia

by the fall of 1924. He claimed that a long-wave station in England with a power of 500 kW had been less effective in communicating with Australia than a short-wave transmitter at 20 kW. He anticipated that short waves would prove especially useful for radio facsimile and television.

Marconi resumed microwave experiments in 1931 using wavelengths of around 50 cm. He installed a microwave link between the Vatican and the summer home of Pope Pius

XI, a distance of about 25 km, in February 1933. Marconi died of a heart attack in July 1937.

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